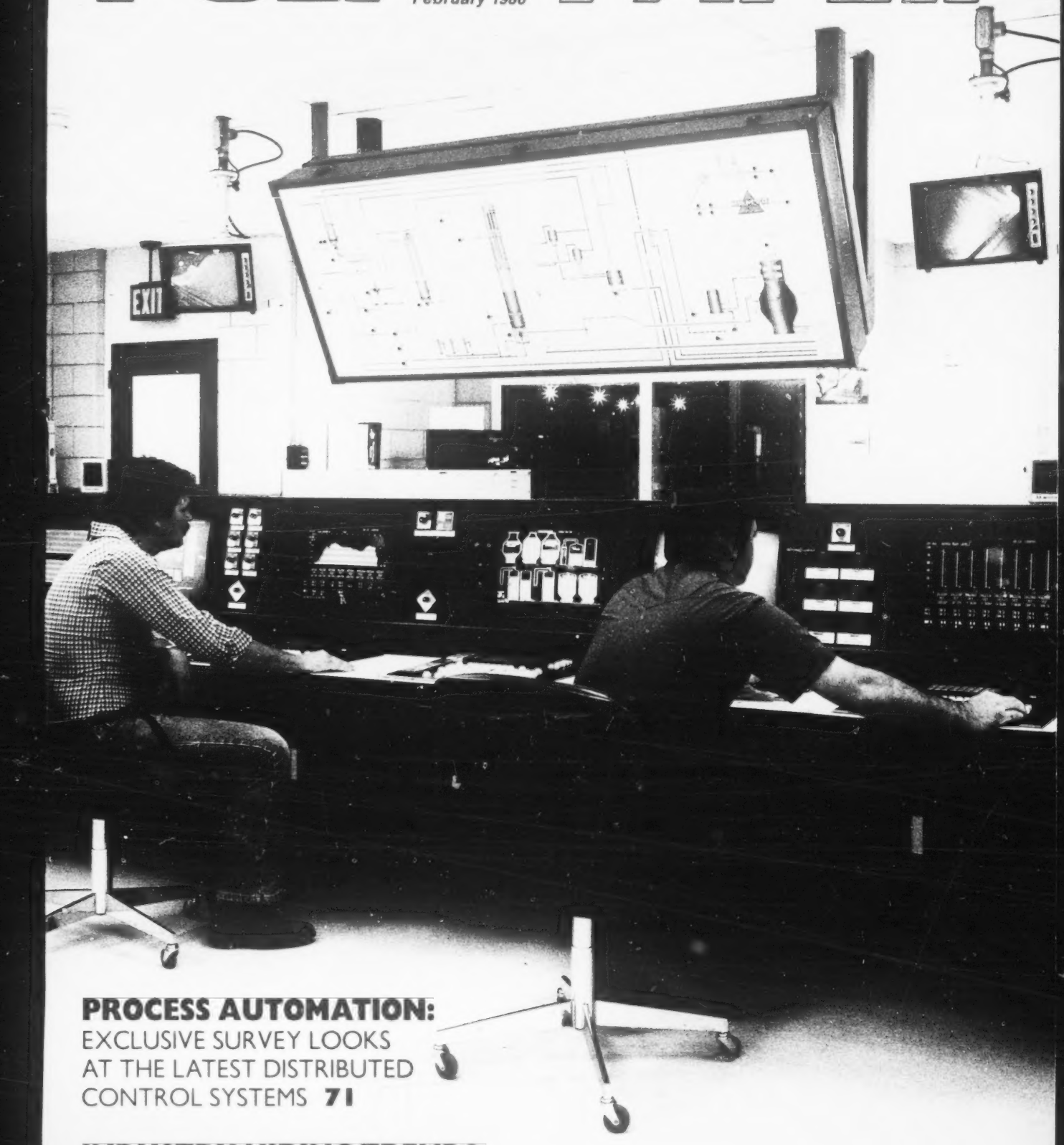
PULP & PAPER

February 1986



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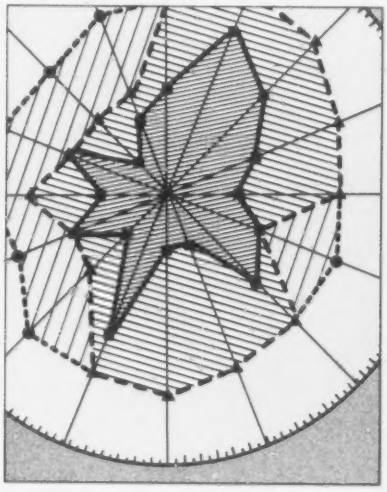

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(Photo courtesy of Honeywell Inc.)

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PULP & PAPER (ISSN 0033-4081) is published monthly except November when semimonthly by MILLER FREEMAN PUBLICATIONS, 500 Howard St., San Francisco, Calif. 94105. Second class postage paid at San Francisco and at additional mailing office.
POSTMASTER: Please send Form 3579 to PULP & PAPER, 500 Howard St., San Francisco, Calif. 94105.

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Subscriptions & Address Change: Sent without charge in the U.S.A. & Canada (upon written request) to individuals in pulp, paper, and board manufacturing firms and paper converting firms. To all others there is a subscription charge of $50.00 a year in the U.S. All subscriptions to other countries: $70.00 a year, except Europe and Mediterranean, $80.00 (air service included). Single copy, $4.50, except Buyers Guide, $30.00. Photocopies of articles and complete microform volumes available through University Microfilms International, 300 N. Zeeb Rd., Ann Arbor, Mich. 48106.

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Send subscription correspondence to:
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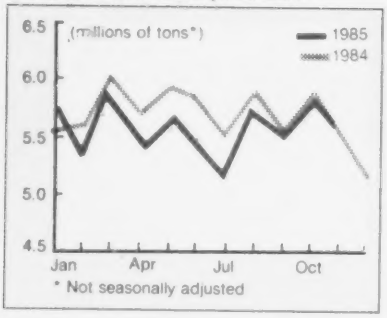
U.S. paper and board production



U.S. production of paper and paperboard totaled 5.6 million tons in November 1985, up 0.4% from the same month the previous year, according to the American Paper Institute. November's total was the first since December 1984 to exceed its year-earlier level. Production on an annualized basis through November was still off 2.4% from 1984, however, and API said that the trend of production still points toward a 2.5% decline to 66.8 million tons for 1985.

Among major grades, uncoated freesheet continued to strengthen, rising 4.9% over 1984's level, but groundwood and coated papers remained weak. Production of kraft linerboard for export jumped 34.8% in November but was still down 17.9% for the year, helping keep total unbleached kraft board production below year-earlier levels. Containerboard inventories were down 7.8% on Nov. 1, and corrugated box shipments slipped 2.2% to 20.7 billion ft² for the month, the Fibre Box Assn. said.

Canadian newsprint shipments continued their slow decline, falling 0.5% in November. Operating rates stood at 93% for the month. Canadian pulp shipments climbed 4.3% above 1984 levels, but November operating rates slipped to 92%. ■

	Latest month (000 short tons)		% change from year ago	Annualized year-to-date (000 short tons)	% change from year ago
PAPER & PAPERBOARD PRODUCTION [1]					
Newsprint	Nov.	438	−4.8	5,443	−2.4
Uncoated groundwood (s)	Nov.	137	7.9	1,511	−4.6
Coated paper (s)	Nov.	473	−8.7	5,908	−5.7
Uncoated free sheet (s)	Nov.	817	12.1	9,731	4.9
Other printing/writing	Nov.	114	−76.6	1,343	−77.3
Total packaging and other paper (s)	Nov.	421	−1.6	5,236	−7.2
Tissue	Nov.	412	3.0	4,933	.5
Total paper	**Nov.**	**2,812**	**1.0**	**34,107**	**−1.5**
Unbleached kraft paperboard	Nov.	1,354	−2.7	16,494	−5.2
Semichemical medium	Nov.	427	3.9	5,095	−2.2
Bleached paperboard	Nov.	327	−1.2	3,973	−2.8
Recycled paperboard	Nov.	659	3.1	7,749	.2
Total paperboard	**Nov.**	**2,767**	**−.2**	**33,310**	**−3.2**
Total U.S. paper and paperboard output	**Nov.**	**5,580**	**.4**	**67,417**	**−2.4**
PULP, WASTEPAPER & FIBER [2]					
Total U.S. woodpulp production	Oct.	4,777	−.4	54,479	−2.8
Market pulp production	Oct.	572	−9.9	6,806	−1.5
Wastepaper consumption at paper/board mills	Oct.	1,309	−5.6	15,222	−3.9
Pulpwood consumption (cords)	Oct.	7,666	.5	86,070	−2.6
CONVERTED PRODUCTS STATISTICS [3]					
Corrugated box shipments (billion ft²)	Nov.	20.726	−2.2	246.883[6]	−1.4
Containerboard inventories at U.S. box plants and mills	Nov. 1	2,492	−7.8		
INTERNATIONAL TRADE [2]					
U.S. paper imports (including products)	Oct.	987	14.2	11,161	5.1
Imports of Canadian newsprint	Oct.	692	9.1	8,140[6]	5.9
U.S. paper exports (including products)	Oct.	334	−5.4	4,024	−9.6
Exports of unbleached kraft linerboard	Nov.	151	34.8	1,745	−17.9
Exports of woodpulp	Oct.	269	−5.3	3,762	4.2
Norscan pulp inventories[4]	Nov. 31	1,554	4.0		
Norscan pulp operating rates[4]	Nov.	91%	90%	79%	87%
CANADIAN STATISTICS [5] *(reported in metric tons)*					
Total newsprint shipments	Nov.	760	−1.3	8,211[6]	−.5
Operating rates	Nov.	93%	94%	92%	92%
Inventories held by U.S. consumers	Nov. 31	1,435	4.3		
Other paper/board shipments	Nov.	278	15.4	2,818	11.1
Woodpulp shipments (export only)	Nov.	602	3.4	6,379[6]	4.3
Operating rates	Nov.	92%	96%	88%	87%

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

TISSUE: Another good year seems likely

Grade structure:
Tissue falls into two major groups: sanitary and "other." About 98% of total output is represented by sanitary; major sanitary grades include bathroom, facial, toweling, napkins, basestock for sanitary stock, wadding, and wipes. The "other" group includes basestock for waxing, wrapping, and miscellaneous. Tissue can also be broken down into consumer products—made to be sold to the general public (about two thirds of output)—and that made to be used in factories, hotels, restaurants, office buildings, and other commercial and industrial settings. Typical basis weights for tissue include 12 to 14 lb/3,000 ft² for single-ply bathroom tissue and 32 to 39 lb/3,000 ft² for single-ply towel.

Production/capacity:
The U.S. tissue industry produced record volumes once again in 1985, but due to an increase in capacity, the industry's operating rate actually dropped by about a point. Capacity in 1986 should rise by about 2%, with only James River Corp.'s 70,000-tpy machine in Naheola, Ala., starting up during the year.

When Crown Zellerbach Corp. announced last year it was indefinitely delaying the expansion of its South Glens Falls, N.Y., mill, the field was narrowed to Fort Howard Paper Co., which is now the only tissue company with announced expansion plans on the drawing board aside from James River.

Fort Howard will bring its new North Savannah, Ga., mill onstream in mid-1987, but the market should absorb this capacity successfully. The American Paper Institute's annual capacity survey projects capacity for the industry rising just 3.2% between 1986 and 1988, which should allow for a continuation of recent operating trends, barring any steep recession.

Outlook:
Most economists foresee a year of moderate but healthy growth in the U.S. economy in 1986, with the GNP rising by anywhere from 2% to 4%. With capacity also rising at a moderate rate, this suggests a continuation of 1985's stable markets.

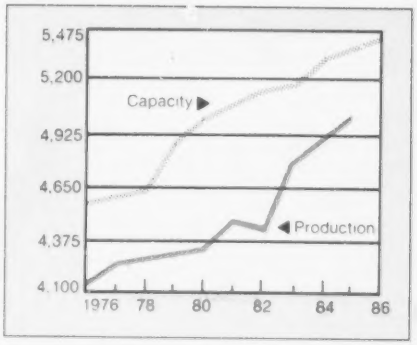
A recession in 1986 or 1987 would interrupt what has become the first period of price stability in the decade, however. In 1984 the industry began to attack the promotional discounting that had plagued price structures in recent years. Plus, Procter & Gamble Co. appeared to shift from a policy of selective price increases to supporting more general hikes. These trends enabled the consumer industry to hold onto a substantial part of the 5% to 8% hikes that took effect in the first quarter of 1985. Commercial and industrial mills also raised quotes by about 6% in mid-1985.

Prices strengthened throughout the year, and if market conditions continue to hold steady, the industry may be able to get prices up again in 1986.

Prices:
Price trends tracked by the Bureau of Labor Statistics' producer price index for sanitary papers and health products are as follows (year-end, 1967 = 100): 1974, 181.1; 1975, 201.7; 1976, 223.5; 1977, 240.7; 1978, 264.3; 1979, 291.0; 1980, 338.8; 1981, 348.4; 1982, 361.0; 1983, 359.7; 1984, 371.4; 1985 (third quarter), 379.0.

Markets:
Breakdown of major tissue end uses is as follows: toilet, 39% (of which 54% is single-ply and 46% is multi-ply); towels, 33%; facial, 7%; napkins, 13%; wipes, 1%; sanitary napkin stock, 2%; other sanitary, 2%; nonsanitary, 2%. Nonsanitary tissue shipments fell from 230,500 tons in 1972 to 110,000 tons in 1983. ■

SUPPLY/DEMAND (000 tons)



FORECAST (000 tons)

	1984	1985	1986e
Production[1]	4,921	4,933	4,995
Capacity[1]	5,276	5,338	5,446
Utilization rate	93.3%	92.4%	91.7%
Imports[2]	30	56	40
Exports[2]	17	19	19
Apparent U.S. consumption	4,934	4,970	5,016
lb/capita	41.9	41.8	41.8
GNP ratio	3.01	2.96	2.91

e = Estimate.
1. American Paper Institute data.
2. U.S. Dept. of Commerce data.

TOP U.S. PRODUCERS (000 tpy)

	Annual capacity	Market share (%)
1. Scott Paper	1,035	19.0
2. Procter & Gamble	900	16.5
3. Fort Howard Paper	620	11.4
4. James River	560	10.3
5. Georgia-Pacific	510	9.4
6. Kimberly-Clark	400	7.3
7. Crown Zellerbach	328	6.0
8. Potlatch	300	5.5
9. Wisconsin Tissue	110	2.0
10. APL	95	1.7

Market share of top five companies:
56.6%

Market share of top ten companies:
89.2%

Total U.S. capacity (1986):
5.446 million short tons

CHANGING TECHNOLOGY WILL INCREASE SOUTHERN HARDWOOD USE IN FUTURE

Technological advances influencing fiber shifts include improved paperboard processes, optimized fiber distribution, and press drying

By PETER INCE

Use of hardwood pulpwood in the U.S. has increased due to technological and economic changes. During the past 30 years, technological change doubled the ratio of hardwood in all pulpwood consumed in the U.S. as a whole. During the same period, economic change more than tripled the total consumption of all pulpwood in the U.S. and nearly quadrupled pulpwood consumption in the U.S. South. These shifts toward hardwood are likely to have an effect on products as well as stumpage prices and forest management opportunities.

HISTORY OF HARDWOOD CONSUMPTION. The history of hardwood pulpwood consumption in the U.S. is explained to a large extent by the morphological differences between hardwood and softwood fibrous materials. Papers made from softwood pulps generally have greater strength than similar papers made from hardwood pulps chiefly because the longer fibers in softwood have a greater capacity to bond to one another. However, delivered hardwood pulpwood is about 30% cheaper per cord than softwood in the South.

The use of pulpwood for papermaking began in the U.S. about 1860, when rags were still the major raw material. Poplar (aspen) was used in papermaking in New England, and it was by far the most common hardwood used in papermaking in the late 1800s. In 1899, poplar accounted for about 13% of all pulpwood consumed in the U.S., 76% was spruce and balsam fir, and the remainder was pine. By 1921, poplar had declined to less than 6% (by some accounts 3%), miscellaneous species matched that portion, and softwood use soared to 85%. In 1952, the data still had not changed a great deal, with hardwoods (all species) amounting to 14.4% of all pulpwood consumed in the U.S. and accounting for only 12.2% of pulpwood consumed in the South.

Since 1952, consistent annual data on hardwood and softwood pulpwood consumption in the South and in the entire U.S. have been kept. This permits an in-depth analysis of hardwood pulpwood consumption during the last several decades, including determination of the influence of new technology on consumption of hardwood pulp.

GATHERING DATA. Annual consumption of all pulpwood went from 26.5 million cords to 84.5 million cords in the U.S. and from 14.6 million cords to 55.1 million cords in the South from 1952 to 1983. If hardwood pulpwood in 1983 still accounted for only 14.4% of total U.S. consumption, and only 12.2% in the South, then hardwood consumption would only be 12.2 million cords in the U.S. and 6.7 million cords in the South. Hardwood pulpwood consumption would have been at those levels had there been no change in papermaking technology since 1952.

However, in 1983 hardwood pulpwood consumption reached 24 million cords in the U.S. overall and 15.2 million cords in the South. That represents 28.4% in the U.S. overall and 27.6% in the South. Figure 1 shows the annual pulpwood consumption from 1952 to 1983 for the U.S. and the South. The figure shows the difference between the two levels (no technological change and actual consumption). The increase in hardwood use is attributed to new technology.

To determine what caused this usage shift, it is necessary to identify the changes in the quantities of various grades of woodpulp produced. According to the American Paper Institute, six different grades of woodpulp exist, four softwood based and two hardwood based. No economic data show the actual amounts of hardwood and softwood used in producing these pulp grades. The softwood-based category includes sulfite, bleached and semibleached sulfate and soda, unbleached kraft, and thermomechanical groundwood pulps.

The hardwood-based category includes semichemical and bleached and semibleached sulfate and soda pulps. If the categories are appropriate, the historical increase in percent hardwood in pulpwood consumption would correlate with the trend in the production ratios of hardwood- and softwood-based pulps, which is precisely what is found.

Mr. Ince is a research forester with the U.S. Dept. of Agriculture's Forest Products Laboratory in Madison, Wis.

CORRELATING DATA. Figure 2 shows production trends of hardwood- and softwood-based pulps from 1952 to 1983 for the U.S. overall and from 1976 to 1983 for the South (earlier data for the South were not available). In the 30-year period, the ratio of hardwood-based pulps grew from 8.8% to 25.3% of all paper-grade pulp. This is very similar to the historical increase in the percent hardwood in pulpwood consumed in the U.S. Calculating the correlation coefficient between percent hardwood in pulpwood and percent hardwood-based pulps in the U.S. from 1952 to 1983 gives 0.979, indicating that percent hardwood in pulpwood consumption correlates almost perfectly with the trend in production of those grades of pulp categorized as hardwood based.

A statistical regression of percent hardwood in pulpwood on percent hardwood-based pulps and percent softwood-based pulps gives the following estimates for the U.S. from 1952 to 1983:

HP_t = 0.793 HBP_t + 0.0904 SBP_t

Standard deviation	(0.0217)	(0.00539)
T-ratio	(36.5)	(16.8)

Durbin-Watson statistic = 0.50

where:

- HP_t = Percent hardwood in pulpwood in year t
- HBP_t = Percent hardwood-based pulp in all paper-grade pulp produced in year t
- SBP_t = Percent softwood-based pulp in all paper-grade pulp produced in year t
- t = years, 1952 to 1982

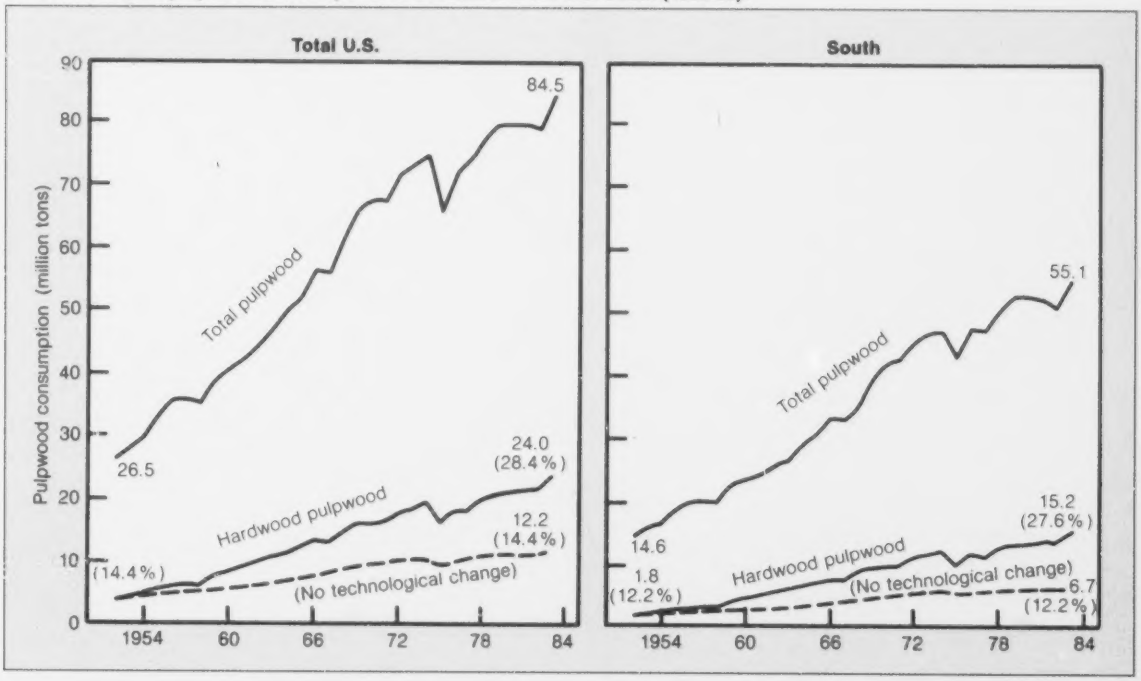
The regression equation provides excellent results and shows that percent hardwood in pulpwood is explained almost entirely by the percentages of hardwood- and softwood-based pulps produced in the U.S. each year. In other words, technological change in hardwood pulpwood consumption is explained by change in the ratio of the two pulps. The regression coefficient also suggests it is statistically plausible that about 79% of the hardwood-based pulp is hardwood fiber, while only 9% of softwood-based pulp is hardwood fiber.

The fitness of predicted values from the estimated regression equation gives a better appreciation of the results. Figure 3 shows a plot of actual percent hardwood in pulpwood consumed in the U.S. from 1952 to 1983. Superimposed on this graph is the predicted values from the equation for percent hardwood in the U.S. (30 years) and the South (six years).

The regression results have such a high fitness that it is unnecessary to look elsewhere for further explanation of the technological change in hardwood pulpwood consumption in the last 30 years. It is clear from the results that the ratio of hardwood in pulpwood is explained by the ratios of hardwood- and softwood-based pulps.

The increase in the ratio of hardwood-based pulp is probably due to both technological and economic reasons and is more difficult to explain. Technologically, the increased use of hardwood-based pulps is due to advances that have allowed greater use of such pulps in papermaking. It is common knowledge that technology

FIGURE 1: **Annual pulpwood consumption for the U.S. and the U.S. South (1952-83).**



has developed during the past 30 years to permit increased use of hardwood fiber in bleached pulps, printing and writing papers, and semichemical pulp used for corrugating medium. Economically, relative demand for those grades of paper that make use of hardwood-based pulps may have increased.

No technical or economic data on relative quantities of hardwood and softwood fiber in various grades of pulp and paper exists. More research should be done in this area. On the other hand, technology still constrains the use of hardwood fiber in softwood-based pulp grades such as unbleached sulfate and in paper grades such as kraft linerboard. Indeed, a correlation of the estimated regression equation with time (Figure 3) suggests that a stable relationship exists between the percent hardwood in pulpwood and the ratios of both hardwood- and softwood-based pulps.

The regression results and their stability over time make it plausible to say not only that 9% of the fiber used in softwood-based pulps is hardwood fiber, but also that this ratio has not changed much in 30 years. Furthermore, softwood-based pulps are still the major category of pulp produced in the South and in the U.S. overall (Figure 2). Clearly, an increase in the use of hardwood pulpwood can be achieved by increasing the use of hardwood fiber in softwood-based pulps.

SCIENTIFIC DEVELOPMENTS. New research has focused on ways to accommodate the use of more hardwood in kraft linerboard. Kraft linerboard consumes most of the unbleached kraft pulp in the U.S., and unbleached kraft pulp is the major grade of pulp in the softwood-based pulp category. In the South, 60% of all softwood-based pulp produced in 1982 was unbleached kraft pulp, and most of it was used in kraft linerboard.

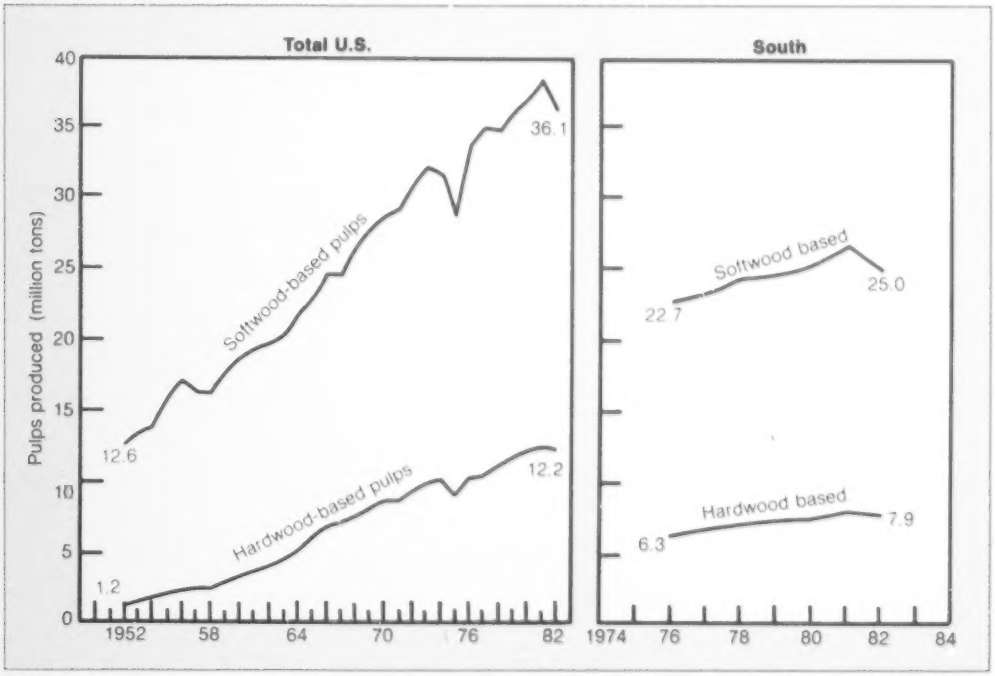
Press drying is a new concept in papermaking and an exciting new idea for kraft linerboard and corrugating medium. In press drying, pressure and heat are simultaneously applied to the paper web. Press drying has a variety of positive effects on papermaking, including increasing strength and enabling hardwood use.

Vance Setterholm of the Forest Products Laboratory (FPL) recognized that with press drying it was possible to produce a high-strength linerboard sheet using 100% hardwood. Researchers at FPL discovered that press drying creates a much better and more stable chemical bond among the fibers. Press drying bonds fibers together in a far superior fashion than do conventional methods, and the bonding works especially well with hardwood fibers. Consequently, with press drying a strong linerboard can be made just as well, if not better, with hardwood raw material.

Press drying also offers major economic advantages in papermaking. Considering the abundance and relatively low market value of hardwood pulpwood in the South, it is natural to assume press drying will be adopted by the linerboard industry in the near future.

At the same time that new concepts in papermaking

FIGURE 2: **Annual production of hardwood- and softwood-based pulps (1952-83).**



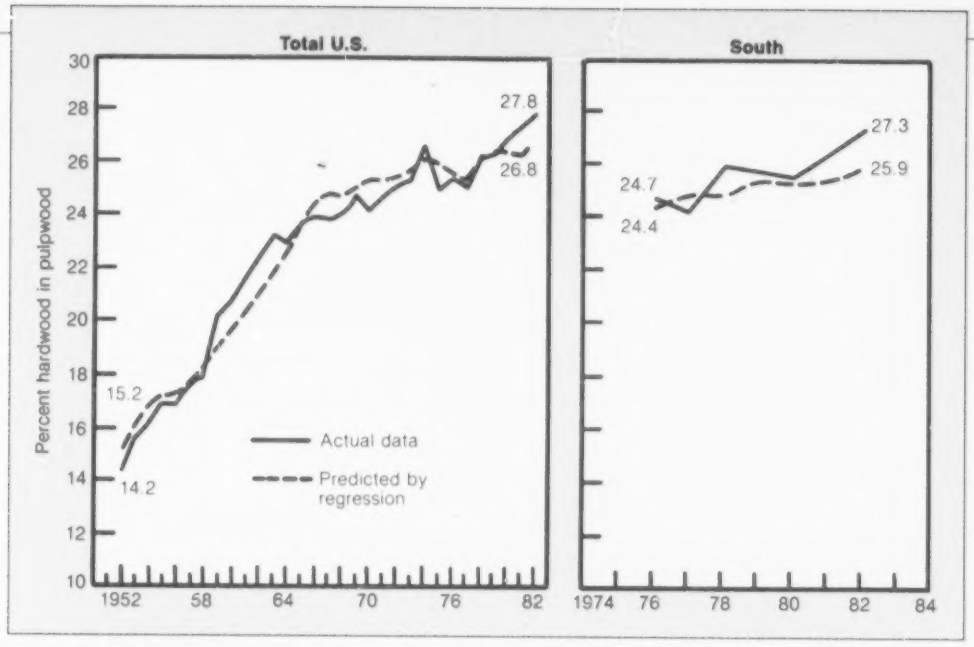


FIGURE 3: **Percent hardwood in pulpwood consumed in the U.S. (30 years) and the U.S. South (six years).**

TABLE 1: **Projections of the percent hardwood-based and percent softwood-based pulp in all paper-grade pulp produced in the U.S. South and total pulpwood consumption of the year 2000, based on time trends in data from 1976-83.**

	Year	
	2000	**1982**
Hardwood-based pulp	30%	24%
Softwood-based pulp	70%	76%
Total pulpwood consumption*	**80.8 million cords**	**55.1 million cords**

*U.S. Forest Service data.

are being explored, improvements are being made in conventional paperboard processes that will also accommodate greater use of hardwood in pulpwood, including recent big improvements in fiber refining. Wet press design improvements have achieved longer residence time of the sheet in the press and higher pressures, resulting in higher sheet density. Equipment to achieve such high density is now installed in linerboard mills.

FPL research confirmed that a sheet made from southern red oak kraft pulp at high density can achieve the same burst, tensile, and compression strengths as a sheet made from southern pine kraft pulp. Another FPL project has shown that by separate refining of hardwood and softwood fibers, it is possible to use more than 50% hardwood fiber in conventional linerboard and achieve satisfactory compressive strength.

The last concern is fiber optimization in corrugated boxes. Modern shipping practices subject corrugated boxes to compressive loads. The primary concern in corrugated used to be the ability to resist rough handling, measured by the bursting strength of boxes. This occurred because boxes were often hand carried and passed through a labor-intensive shipping environment with a high likelihood of being dropped.

Today boxes have to withstand stacking and compression forces. Boxes are now being mechanically palletized, shipped, and handled in unitized stacks. Collapse due to inadequate compression resistance is the main hazard in this environment. Papermaking becomes more rational when it is aimed at improving box performance in terms of compression strength.

Research at FPL on optimizing fiber distribution in corrugated boxes quantifies the advantages of using compression strength as the criterion for producing corrugated boxes. Hardwood fiber in linerboard can overcome its low burst strength and compete with softwood according to a compression strength criterion, especially if the linerboard is produced using a process such as press drying. Although corrugated boxes are still produced according to the old burst test criterion, consumers increasingly demand compression strength tests, which will become the new criterion of the future. This has the potential to greatly increase the use of hardwood fiber in linerboard.

PROJECTIONS OF THE FUTURE. If by the year 2000 hardwood accounts for 50% of all fiber in softwood-based pulps produced in the South, this would, of course, change the historical formula for estimating percent hardwood in pulpwood consumed in the South. The historical formula is:

$$HP_t = 0.793\ HBP_t + 0.0904\ SBP_t$$

In other words, this suggests that hardwood-based pulp is 79% hardwood and softwood-based pulp is 9% hardwood. If 50% of softwood-based pulps were hardwood, the formula would become:

$$HP_t = 0.793\ HBP_t + 0.5\ SBP_t$$

The last equation provides a different technological alternative for looking ahead to the year 2000. The his-

torical alternative is represented by the first equation, and new technology alternatives are contained in the second. The first alternative says the historical relationship between percent hardwood in pulpwood and pulp grades will remain the same. The second alternative states technological change will increase the ratio of hardwood fiber in softwood-based pulps. It should be noted that this does not consider timber prices or the effect of shifting timber supplies. It only considers the constraint on technological change.

Pulp-grade data for the year 2000 are obtained for this analysis by straight-line projection time trends since 1976. Projections are shown in Table 1. For 2000, it is projected that 30% of the pulp produced in the South will be in the hardwood-based pulp category, while 70% will be in the softwood-based pulp category. Pulpwood data for the year 2000 are obtained from the U.S. Forest Service Timber Analysis report (1982). Total pulpwood consumption for the South is projected at 80.8 million cords/year.

When the first equation is applied to the projected data, percent hardwood in pulpwood is projected at 30.1% of the total pulpwood consumed in the South in 2000. This closely agrees with the U.S. Forest Service report of 29.5%. Both projections suggest hardwood pulpwood consumption will be about 24 million cords at the close of the century. This is the level of hardwood pulpwood consumption forecast by historical trends in technology relationships for the South. When the second equation is applied to this data, percent hardwood in pulpwood is projected at 58.8% of total pulpwood consumption, or 47.5 million cords—about double the level projected by historical relationships.

It is at least technically feasible to suggest that 58% of the pulpwood consumed in the South could be hardwood by 2000. The historical trend in the U.S. is in the direction of greater hardwood use, particularly with regard to the scientific developments previously mentioned in traditionally softwood-based pulps. For comparison, in 1981 59% of the pulpwood consumed in Japan was hardwood, while 30 years ago only 10% of the pulpwood consumed in Japan was hardwood.

Note that none of the projections shown here, except for the U.S. Forest Service report, are econometric projections. The projections are not based on detailed analysis of timber supply constraints or market considerations. They focus only on the constraint of technology on hardwood use and on what might happen if that constraint is removed by new scientific developments. The projections do not purport to show precise future levels of estimated pulpwood consumption, but only show major impacts of new technology could occur in the future. More effort is needed to study and appreciate the proper magnitude of these impacts.

It has been suggested that new developments in pulp and paper science may change technology and increase the use of southern hardwoods, particularly in traditional softwood-based pulps such as unbleached kraft used in the production of linerboard. At the outside limit, it is conceivable that the use of hardwood fiber in softwood-based pulps could increase from the historical 9% to 50% or more. If such levels are reached by the year 2000, hardwood pulpwood consumption in the South could more than double the level projected by historical technological relationships. Results indicate that in any case hardwood pulpwood consumption will increase for the South in the future and may dramatically increase as a result of recent scientific developments.

ECONOMIC PAYOFFS. The payoff, in terms of forest management opportunities, can take several forms. First, there will be a payoff in terms of continued and increased removal of pulpwood-grade hardwood from the forests of the South. This may be a silvicultural benefit for the South if it means better use of lower-grade hardwoods. The projected increases in the volume of hardwood pulpwood consumed in the South could guarantee this payoff.

Second, stumpage values represent a potential payoff. Economic common sense would imply that as the demand for hardwood goes up, the value of hardwood stumpage will also increase. However, data examined for this report show no such effect for hardwood pulpwood in the South since 1976.

The data examined consisted of Timber Mart-South's monthly stumpage values for hardwood pulpwood in the Southeast and the American Pulpwood Assn.'s monthly data for hardwood pulpwood consumed in the Southeast. The monthly difference in hardwood pulpwood consumption was compared with the monthly difference in hardwood pulpwood stumpage value.

If hardwood pulpwood consumption affects stumpage value, some statistical correlation between the two sets of data should exist. No such correlation was found. The correlation coefficient was calculated at 0.017. Consequently, it is difficult to suggest statistically that increasing hardwood pulpwood consumption will increase hardwood pulpwood stumpage value in the South, although this hypothesis makes sense from an economic standpoint.

It would appear that a dominating supply-side influence on hardwood pulpwood stumpage value overrides any effect of demand changes. Perhaps an increase in hardwood growth or harvesting efficiency have offset the effect of increased consumption of hardwood pulpwood in the South. Nevertheless, stumpage value depends on many factors not specifically covered in this article.

Another potential effect of increased use of hardwood could be a dampening effect on the rise in softwood market value, which could be a benefit for the wood-using industry of the South. An understanding of these kinds of effects requires a much more detailed analysis than what is presented here. ■

AS PAPER INDUSTRY EMPLOYMENT FALLS, HIRING DEMOGRAPHICS ARE CHANGING

Mergers, consolidation, and recession have reduced employment opportunities despite increased production—trend likely to continue

By TRYG R. ANGELL

The years between 1979 and 1983, highlighted by back-to-back recessions, were turbulent ones for the pulp and paper industry. Particularly hard hit were the primary product producing sectors, whose operating conditions rivaled or exceeded those of the 1974-75 period in severity. As expected, these difficult operating conditions quickly reduced employment levels throughout the industry. In addition, the same period saw a number of mergers, consolidations, and restructurings that also reduced employment levels. The effect of these crosscurrents has not yet been fully reflected in employment statistics.

The North American industry saw substantial drop offs in employment for technical, professional, and sales employees, as well as the usual drop in production employment. In the 1979-83 period, total employment in the primary product sectors (pulp, paper, and paperboard) in the U.S. declined by 4.9%, and employment in production dropped by 5.6%. On a roughly comparable basis, the U.S. fared better than Canada, where total employment dropped 5.7%, and production employment fell by 7%. The absolute number of employees in each category is much smaller in Canada, but the personnel dislocations were more severe.

In Canada, the absolute lows in employment were registered in 1982, according to preliminary data from Statistics Canada. In the U.S., total employment continued to slip in 1983. However, production employment rose in that year, stemming a decline that had been continuous since 1980.

EFFECT OF RECESSION. After each recession, neither total employment nor production employment returned to previous levels during the ensuing recovery period. This trend has been in evidence since 1969, and there is no reason to expect that the current recovery will be any different. The restructuring under way in the industry can be expected to continue and to influence both the levels of employment and the type of employee in the foreseeable future. Table 1 traces the history of employment by type of employee for the primary product sector since 1979 and clearly shows the effect of the trends discussed.

What about the future, and what may be expected during the next two to three years? Total industry trends can sometimes be misleading since they tend to mask some of the more subtle crosscurrents and shifts.

An examination of a small but highly important sector of the industry can be revealing. The chemical paper-grade market pulp segment of the industry serves as a very good proxy for the general health of the whole industry, both in the U.S. and abroad. It reflects demand from domestic mills, both integrated and nonintegrated, as well as export demand from abroad.

An indication of the responsiveness of this relatively small sector to changes in the industry is seen in the shipment history of 1983 and 1984. In 1983 U.S. chemical paper-grade market pulp shipments were 4.8 million metric tons, up about 7% over the depressed levels of 1982. In 1984, shipments rose to 4.96 million metric tons, a 3% increase. In each year, export demand counted for slightly more than one half of the total. However, the export percentage dropped slightly in 1984, partly in response to strong domestic demand—in part as a result of strong operating rates at printing paper mills—and partly as a result of a labor dispute in Canada that reduced or disrupted normal supply sources.

This sector represents about 10% of U.S. paper-grade pulp production. What did this recovery in the pulp sector, driven by the strong markets for printing paper grades, do for employment? Regrettably, it didn't do much, at least in so far as preliminary data show.

Table 2 shows what has happened in respect to both total employment and production employment in the pulp industry since 1977. That year is a point in the last business cycle roughly comparable to 1983 in the current cycle. For this level of industry detail, only preliminary estimates, sketchy and subject to considerable revision, are available. The data show only small changes in the employment picture. It should be kept in mind that one more mill was operating in 1984 than 1983.

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The best comparisons may be made between 1977 and 1982. Both are Census of Manufacturers' years, and therefore avoid the sample errors inherent in the Annual Survey data. While data for the intermediate years do show, with some error, the ups and downs related to the recession and to strikes, a trend may be extracted between these two points. It is clear that the compound annual growth rates are low— well below the rate of growth of the economy—and certainly well below the rate of growth of either output or capacity. However, the pulp sector is doing a bit better than the industry as a whole, where actual *declines* in employment are prevalent in many sectors. Also, it is important to remember that chemical market pulp capacity increased 45% between 1977 and 1982.

FUTURE EMPLOYMENT OPPORTUNITES. The rest of this article will explore what the events of the last five years suggest for the future as well as the implications for professional, technical, and marketing employment. This will be done based on my professional recruiting experience in these disciplines in both the U.S. and Canada. While the data discussed earlier are illuminating, a qualitative viewpoint, based on the industry's recruiting efforts, can be even more revealing.

It is clear that the industry will continue to expand, particularly in the U.S. South. What is not clear is that it will be able to hold its position as the world's low-cost fiber producer. It has long been regarded as an article of faith that the U.S. South was the world's lowest-cost fiber producer and that the U.S. enjoyed a comparative advantage with respect to pulp production. The strength of the dollar, plus strategic currency devaluations on the part of Scandinavians, calls this into question. The world pulp market is denominated in U.S. dollars; offshore producers' costs are in their own currencies.

"Productivity" is a popular catch phrase today and is offered as a panacea for the ills of any industry. From the data already presented, it is clear that the pulp sector has had its share of productivity improvement. This is especially evident in the professional, technical, and sales areas. The large increases in output and the shifts in market conditions have been handled with only small increases in head count. If this level of efficiency is to be maintained, what kinds of people will be needed and where will they come from?

First, it is clear from the search assignments I receive that "quality" and "selectivity" are of prime importance. While clients are more selective, particularly for management and sales, the pool of talent from which to draw is relatively static in size. It seems that a process of natural selection is at work here; individuals do emerge over time, but more by their own innate capabilities than through an active, managed development process.

The track record—and the way it is accomplished—is important. People skills have become more important, and educational breadth rather than technical content is looked at more closely.

Second, the pulp industry employs something less than 3% of the "nonproduction" workers in the entire industry. When the technical and supervisory workers are netted out, a rather small cadre of sales, marketing, and managerial personnel are left. The industry has not been known for its efforts to formally develop its sales and professional people for higher-level responsibilities or to expand the pools of talent from which it draws. In this, the pulp sector is not unlike other sectors of the industry—a certain "compartmentalization" exists in that it is very difficult to move from one part of the industry to another. Experience is a bit "inbred."

SKILLS DEVELOPMENT INBRED. Training programs abound in the industry, mostly at the entry level, with some available in sales effectiveness and sales management techniques for new sales managers and periodic updatings for the seasoned sales professional. The most common technique for developing senior management talent seems to be informal "mentoring." This is a problem for talented individuals without the opportunity to be seen by the senior managers who are mentors. This does not necessarily reflect upon the individual; the per-

TABLE 1: **Employment in the U.S. primary product sectors, pulp, paper (including building paper), and paperboard.**

Year	Total employment (000)	Production workers (000)	Other* (000)
1979	271.4	206.6	64.8
1980	268.4	203.2	65.2
1981	267.3	203.0	64.3
1982	258.9	195.7	63.2
1983	258.2	195.0	63.2
1984	264.0	199.6	64.4

*Administration, technical, sales.
Source: American Paper Institute. Statistics of paper—1985. Bureau of Labor Statistics, "Employment & Earnings."

TABLE 2: **Employment in U.S. pulp mills, 1977-83.**

	1983[1]	1982[2]	1977	Percent change (1983–82)	Compound annual growth (1977–82)
Total employees (000)	16.7	16.7	16.2	0	0.6%
Production workers (000)	12.9	12.8	12.5	<1.0%	12.5
Administrative, technical, and sales employees (000)	3.8	3.9	3.7	−2.6%	3.7
Payroll ($ million)	n.a.	467.9	293.2	n.a.	9.8%
Wages ($ million)	n.a.	345.1	220.5	n.a.	9.4%

n.a. = Not available.
Sources: 1. Bureau of Economic Analysis.
2. U.S. Bureau of the Census.

son may be in a position not traditionally regarded as suitable for advancement to senior management.

An example of this may is found in women in the industry. While saleswomen have been a fixture in the distribution sector of the business for some time and have gained acceptance in the converted product sectors, some even achieving sales management levels, they have only a small representation in the primary product sectors. Women chemical engineers have been an increasing part of the work force for some time. Women are found in more staff functions in the industry but rarely found in marketing, sales, or management.

Search specifications continue to bear this out. The sales and marketing areas are the places in the industry that have a good track record into executive ranks, to say nothing of the opportunities for high compensation.

The demographics of the work force are changing in quantity, quality, and gender. At the same time, the employment profile of the pulp and paper industry has remained relatively constant. The industry must meet the complex challenges that it faces today: increased competition in world markets and the need to maintain and enhance productivity at all levels. If it is to attract the high skill levels needed to meet these challenges, it must expand the pool of talent from which it draws. As women become a larger part of the total work force (which they will do), it is important that they become better integrated at all levels, including operations. This means they must be accepted in nontraditional roles.

RE-EXAMINE ATTITUDES. To accomplish this, certain things must happen. First is a re-examination of the attitudes of management in this male-dominated business. Many women in the industry question how serious management really is about career development for women. Management apparently doubts the commitment women have to their careers. Women perceive a reluctance by management to consider them as serious candidates. This can be the most difficult perception of all to overcome. One way to at least begin to improve the situation is for senior management to set goals for getting women into line jobs and to make women's accomplishments a part of the performance criteria of the line managers. This requires a flexibility of thinking that has, so far, been exhibited by few companies.

Communications need to be opened so that women interested in advancement can make their decisions known to the level of management that can help them, not just to the human resources people. A real two-way dialogue has to exist, not just pronouncements from on high with no tangible evidence of commitment.

Obviously, such steps would introduce some very different individuals into management ranks and perhaps elevate the discomfort level of the incumbents. However, change to accommodate developing circumstances is as important in recruiting and management development as it is in the production part of the business. ■

GASPESIA PULP MILL UPS YIELD

(Continued from page 119)

The designed capacity of the chemimechanical pulp mill—235 short tpd—has been reached. The new plant's instrumentation and controls are operated through a Foxboro Videospec system, which makes the operation of the plant possible with only two people per shift.

ELIMINATING CHEMICAL PULP. Table 1 presents a comparison of pulp properties for the type of chemimechanical and sulfite pulp produced at Chandler. Newsprint quality changes before and after the new pulp was introduced into the furnish are shown in Table 2.

Total replacement of chemical pulp in the newsprint furnish has not been successful as yet, but the percentage made up by sulfite has been reduced from 25% to 10%, with chemimechanical at around 25%. The experience at Chandler has been typical of that at other newsprint mills seeking total replacement of chemical pulp with chemimechanical pulp from cooked chips—all have difficulties eliminating the use of chemical pulp.

The major difficulty with the new process has been the presence of sufficient pitch in the pulp to seriously affect paper machine runability. This has been brought under control, and the mill is optimistic about eventual total replacement of sulfite pulp in the furnish. ■

TABLE 1: **Comparison of pulp properties.**

	Bisulfite chemimechanical	Low yield sulfite
Freeness	415	690
Tensile	7.0	8.5
Burst index	4.0	5.5
Tear index	8.3	8.8
Percent stretch	2.0	2.3
Wet breaking length	340	500
Percent o.d.	42	45
Percent stretch	3.7	4.7
Brightness (Elrepho)	55	59
Opacity	91	90

TABLE 2: **Newsprint quality, No. 1 machine.**

	Before new pulp	After new pulp
Caliper	0.072	0.075
Tear		
CD	244	236 — 3%
MD	169	155 — 10%
PPS (S-10)		
Felt	2.89	3.33
Wire	3.07	3.50
Printing opacity	95.2%	94.0%
Tensile	25.0	24.9
Formation NUI	8.0	9.4
Headbox coins	0.69	0.72
Mixed stock freeness	181	162

Industry performance study

A new report, ***Financial Performance of Forest Based Industry*** in 1975-84/85, from Jaakko Pöyry, is a study of 163 major companies producing pulp, paper, and wood products in 12 western European and North American countries. Presented are detailed statements and calculations of earnings, balance sheets and sources, and applications of funds for each company reviewed. The study also gives information on product mix and the general economic environment in each country. The study includes solid wood products, pulping, and papermaking capacities; concise market reviews for solid wood products, pulp, and paper; cost competitiveness by region; and eeonomic development by country. Financial performance of major producers in 1980-84 is given by product segments, covering newsprint, tissue, fine papers, packaging, market pulp, and building products. The data are compiled into four reports, including the Executive Summary, which lists background data on all companies analyzed in the study, and Basic Company Data, which is presented in three separate reports for North America, Scandinavia, and western Europe. Prices: Executive Summary, $750, $200 for each additional copy; Basic Company Data, $500 per report. Write: Jaakko Pöyry, Box 16, SF-00441 Helsinki, Finland.

Natural convection

A new 1,181-page book, ***Natural Convection: Fundamentals and Applications***, edited by S. Kakac, W. Aung, and R. Viskanta, discusses the information presented at an international forum designed to aid future progress in the field of natural convection. The forum was held by a NATO Advanced Study Institute (ASI) July 16-27, 1984. Topics covered include external boundary layer flows, plane layers, enclosure flow including tube bundles, turbulence modeling, mixed convection, stratified fluids, thermal plumes, natural convection in porous media, influence of temperature-dependent properties, numerical and experimental methods, natural convection in melting and solidification, natural convection/radiation interaction, and various applications and unresolved problems in natural convection. Price: $125. Write: Hemisphere Publishing, 1010 Vermont Ave. N.W., Washington, D.C. 20005.

Hydraulic valve standard

NFPA Recommended Standard Hydraulic Fluid Power Valves—Mounting Interfaces is a newly published standard from the National Fluid Power Assn. (NFPA). It gives the dimensions and general criteria for the mounting surfaces of nine types of hydraulic valves. The document provides graphic symbols, 31 figures, and 31 tables to help ensure interchangeability of directional, flow, and pressure control valves; check and pilot-operated check valves; and sequence, throttle, unloading, and pressure relief valves. Price: $25. Contact: National Fluid Power Assn., 3333 N. Mayfair Rd., Milwaukee, Wis. 53222.

Industrial evaporators

Industrial Evaporators, by Eli Nisenfeld, is a 280-page book providing a basic explanation of the principles of the unit operation of evaporation and the various types of evaporators and commonly used associated equipment. The critical operating and control parameters and variables on stability and economics are also presented. The book discusses basic instrumentation of evaporators and presents the pros and cons of various approaches to controlling evaporators. Development of procedures and mathematical models for control evaporators is also detailed. Price: $28 for ISA members, $34.95 for nonmembers. Write: Instrument Society of America, Publications Dept., 67 Alexander Dr., P.O. Box 12277, Research Triangle Park, N.C. 27709.

Steam systems

Nomograms for Steam Generation and Utilization, by V. Ganapathy, is a 175-page compilation of charts designed to simplify design calculations and estimates for all phases of steam systems. More than 70 nomograms are presented, each including a brief synopsis of theory and nomenclature and an example demonstrating use of the chart. The nomograms make it possible to study the effects of any variable by moving a straightedge. The book is organized into chapters covering fuels, combustion, heat transfer, steam generation and usage, valves, piping, and fluid flow. Sample problems using life cycle costing show how to arrive at optimum designs. Price: $32. Write: Fairmount Press, P.O. Box 14227, Atlanta, Ga. 30324.

Corrosion resistance

Corrosion Resistant Materials Handbook, edited by D.J. De Renzo, provides information on choosing commercially available corrosion-resistant materials for particular applications. Materials covered include synthetic resins and polymers; rubbers and elastomers; cements, mortars, and asphalts; ferrous alloys; nonferrous metals and alloys; and glass, ceramics, and carbon-graphite. A corrosive material index organized by chemicals and other corrosive substances, a trade name index, and a company and address listing are also included. A section containing 13 tables compares the anticorrosive merits of commercial engineering and construction materials. Price: $125. Write: Noyes Publications, Mill Rd. at Grand Ave., Park Ridge, N.J. 07656.

Efficient boiler operations

Efficient Boiler Operations Sourcebook, by F. William Payne, is a 221-page application-oriented book written to help operators and supervisory personnel improve boiler efficiency. It covers specific methods and assesses potential cost savings. A financial evaluation procedure used for determining the cost-effectiveness of boiler auxiliary equipment is presented. Other features include boiler efficiency calculation methods, testing and flame evaluation techniques, and guidelines for establishing a comprehensive boiler maintenance program. Various equipment available to improve boiler efficiency—including air preheaters, firetube turbulators, economizers, heat recovery systems, combustion control systems, and O_2 trim control—is discussed and evaluated. Price: $36. Contact: Fairmont Press, Box 14227, Atlanta, Ga. 30324.

Correction

In a recent article entitled "Use of cornstarch in papermaking is changing with new technology" (*P&P*, Dec. 1985, p. 83), an error was made in the listing for National Starch & Chemical Corp. in Figure 4, on p. 85. The listing for the company should have read: 1,250 million lb, with plants in Indianapolis, Ind. (750 million lb) and North Kansas City, Mo. (500 million lb).